FBI Calibration from a Front End

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This process calibrates any Fast Bunch Integrator so that it is ready for ACNET scaling. This process does not require beam. It does require a scope, and an arbitrary waveform generator.

The Comet A/D cards do not have any calibration features within the card. It is therefore necessary to calibrate their offsets in the front-end code. The remainder of the front-end calibration is done in the integrator cards, which have both offset and gain calibrations on the card.

In the Tevatron FBI systems all the intensity readbacks are arrayed devices. This means that 36 bunches, one background and one summation all have the same ACNET offset and gain. For this reason the ACNET offset is kept at zero. This is done because an offset would add the same number to each channel that it added to the sum of all channels. Due to the desire to keep operational differences at a minimum, the Main Injector FBI is calibrated the same way even though all of its channels are separate ACNET devices.

1. Terminate the input to a Comet board channel with a 50-Ohm terminator.
2. Zero the ACNET A/Ds using the offsets in the fbi.h header file.
3. Repeat for all Comet channels being used.
4. Reconnect the integrators to the Comet boards.
5. Terminate the input to one of the integrators.
6. Zero the ACNET A/Ds using the integrators offset.
7. Repeat for all integrator channels being used.
8. Connect one of the inputs of the integrator (usually the Proton Widegate) to the arbitrary waveform generator.
9. Set the gain on the integrator channel using an ACNET FBI channel value to approximate the value input by the AWG.
10. Repeat for all FBI channels. Make sure to keep the AWG output at a constant. This will set the gains on all of the channels equal to one another.

Front-end calibration is now complete. One last step must be done to calibrate the FBI channels to a DCCT using beam.

1. Beam is now used to set the sum of the Proton Widegate equal to the DCCT for beam. The ACNET database scale factor should be changed to make this equal. Since all channels have been equalized with the AWG, the same scale factor should then be used on all FBI readbacks.

Devices and scaling applications:

Comet		Integrator		Front-end		ACNET	
Offset	Gain	Offset	Gain	Offset	Gain	Offset	Gain
NA	NA	used	used	used	static	static	used